National Aeronautics and Space Administration

NASAfacts

Airspace Technology Demonstration 2 (ATD-2)

Integrated Arrival/Departure/Surface (IADS) Traffic Management

What is the problem?

Much of the inefficiency in today's air transportation system can be attributed to a lack of information sharing amongst the operators responsible for managing air traffic in busy terminal environments. Concepts and technologies to improve the handling of arrival, departure, and airport surface traffic have been under development by NASA, the Federal Aviation Administration (FAA), and industry, but to date, these capabilities have largely been developed and implemented independently. NASA's investigation into the needs of air transportation stakeholders, including airlines, air traffic service providers, airport authorities, and technology vendors, revealed that an integrated approach is needed to address this inefficiency. Without shared information across the operation, a lack of predictability of aircraft movement times persists and leads to overall system inefficiency and greater fuel burn and emissions.

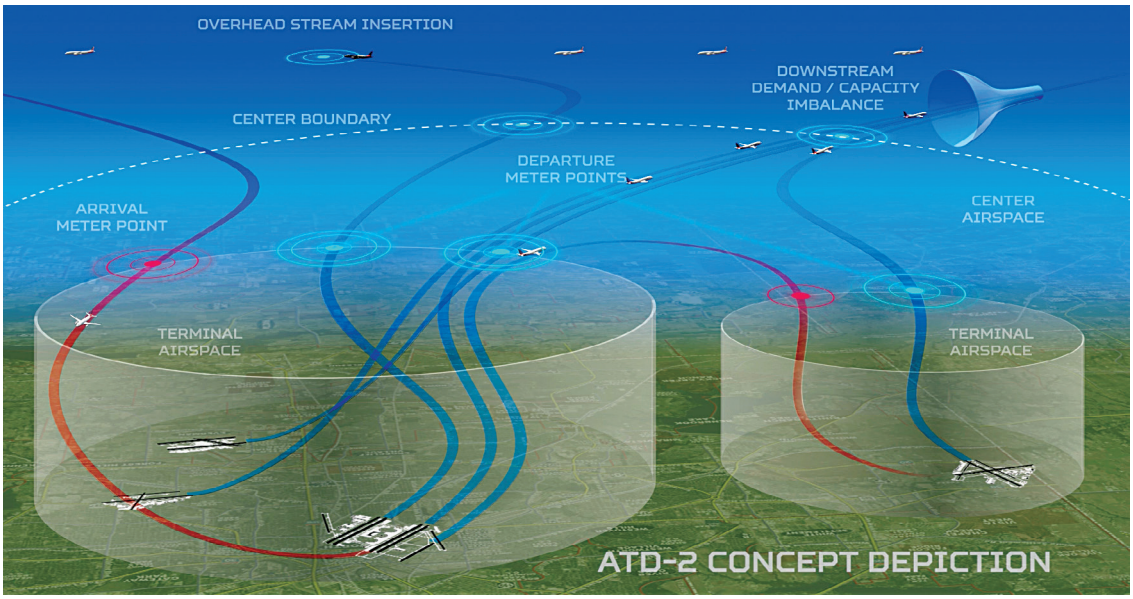
The ***Airspace Technology Demonstration-2 (ATD-2)*** effort provides solutions to several problems in the complicated, multi-airport environment. At most airports today, departures are managed in the order they push back from the gate, which can overload runways and cause excessive taxi and hold times.

Additionally, significant uncertainty in the duration of the taxi-out, takeoff, and climb phases of flight leads to inaccurate demand predictions, decreased situational awareness, and overly conservative airspace restrictions that traffic managers are compelled to apply to compensate for this uncertainty.

What is NASA's solution?

Working with the FAA and industry, NASA has developed an integrated arrival, departure, and surface (IADS) concept and technology to demonstrate the benefits of an IADS traffic management system for complex terminal environments. ATD-2 leverages previous investments by NASA, the FAA, and industry, including the FAA's three major operational decision support system technologies (Traffic Flow Management System (TFMS), Time Based Flow Management (TBFM), and Terminal Flight Data Management (TFDM)).

The ATD-2 Field Demonstration will preview several aspects of the under-development TFDM system such as Surface Collaborative Decision Making (Surface CDM) departure metering, the Electronic Flight Data user interface in the airport tower, and data sharing with industry via the TFDM Terminal Publication (TTP) service.



Operational Environment for the ATD-2 Concept

A Traffic Management Coordinator (TMC) in the air traffic control tower at CLT (shown here) uses ATD-2 tools to coordinate departure release times with a TMC in the en route Center.

A ramp manager at CLT uses the ATD-2 IADS System to implement departure metering in collaboration with TMCs in the air traffic control tower.

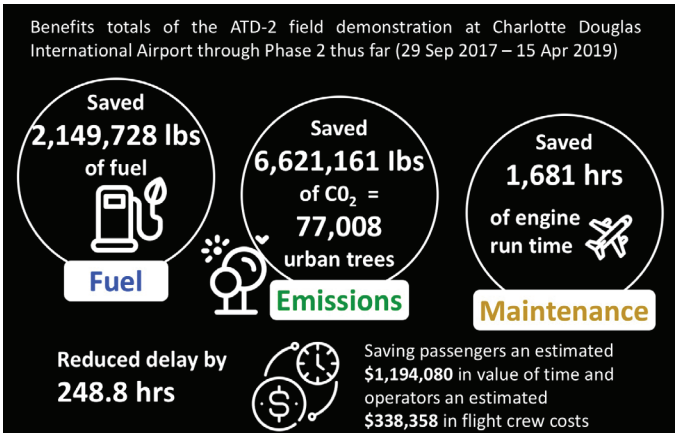
NASA's ATD-2 IADS System improves the efficiency of surface operations at the nation's busiest airports through time-based metering of departures and improved sharing of flight operations information amongst the various airport surface stakeholders. ATD-2 departure metering recommends holding some departing flights a little longer at the gate instead of having them wait in long departure queues at the end of the runway. Shifting some of the departure wait time from the taxiway to the gate saves fuel, reduces emissions, and gives airlines and passengers more flexibility in the period prior to pushback.

The ATD-2 IADS System also couples a trajectory-based surface decision support tool (similar to TFDM) with the overhead stream insertion capabilities of the TBFM en route metering decision support system. The result is more precise scheduling of surface departures into constrained overhead flows, better communication between the en route and tower controllers, and significant improvement in compliance with target takeoff times.

The NASA-FAA ATD-2 field demonstration is being conducted in three phases. The first baseline IADS phase commenced on September 29, 2017 and demonstrates tactical surface departure metering at the American Airlines ramp tower and FAA's Air Traffic Control Tower at Charlotte-Douglas International Airport, as well as overhead stream insertion at Washington Air Route Traffic Control Center. The next phase extends the surface departure metering time horizon with strategic planning tools, interfaces with tower controller electronic flight strips, and expands overhead stream insertion to Atlanta Air Route Traffic Control Center. The final phase demonstrates a Terminal Departure Scheduling capability that considers multiple airports and terminal boundary constraints. This third phase will be conducted at Dallas/Fort Worth Terminal Radar Approach Control, Fort Worth Air Route Traffic Control Center, Dallas/Fort Worth (DFW) and Dallas Love Field (DAL) Air Traffic Control Towers, and American and Southwest Airlines facilities at DFW and DAL airports, respectively.

What are the benefits?

Field demonstration results of departure metering from Phase 1 through Phase 2 thus far (September 29, 2017 through April 15, 2019) suggest that the ATD-2 IADS System saves fuel and emissions, reduces congestion on taxiways, and improves compliance with scheduled takeoff times for managing overhead stream insertion.



At the end of each demonstration phase, NASA will provide an ATD-2 technology transfer to the FAA and industry partners.

For more information on Airspace Technology Demonstration 2, please visit

www.aviationsystems.arc.nasa.gov.

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